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PRESTONIA: AN AMAZON NARCOTIC OR NOT?

BY

RICHARD EVANS SCHULTES AND ROBERT F. RAFFAUF

I.

THROUGHOUT the literature concerning native narcotic plants of South America may be found the statement that *Prestonia amazonica* (*Haemadycion amazonicum*), an apocynaceous vine, is the basic ingredient in the hallucinogen known as *yaje*. But many specialists, including most field investigators, have attributed *yaje* to sundry species of the malpighiaceae genus *Banisteriopsis*. They have been in essential agreement that *yaje* (of the westernmost Amazon of Colombia, Ecuador and a part of Peru, especially along the eastern slope of the Andes), *ayahuasca* (of Peru, Bolivia and part of Ecuador) and *caapi* (of the northwestern Amazon of Brazil and adjacent parts of Colombia) seem to be identical narcotics prepared from malpighiaceae plants.

That a member of the *Apocynaceae* might be employed in the Amazon as the source of a psychotomimetic drink is vitally important and would not appear to be an improbability. It was for this reason that Schultes (28), in 1957, reviewed the history of reports concerning *Prestonia amazonica*, keeping a sharp outlook for any well documented and botanically supported record. He concluded that while *Prestonia amazonica* is frequently

“named as the source of yaje and caapi. . . . there is little or no reliable evidence that this vine is ever employed, at least as the prime ingredient, in preparing the narcotic drink.”

A chemical study, published shortly thereafter by Hochstein and Paradies (11), seemed, however, to end all uncertainty. Entitled “Alkaloids of *Banisteria Caapi* and *Prestonia amazonicum*” [sic], it reported that “the hallucinogenic plant *Banisteria Caapi* contains in addition to harmine, the alkaloids harmaline and *d*-tetrahydroharmine” and that “*Prestonia amazonicum* leaves have yielded another psychotomimetic amine, N,N-dimethyltryptamine.” The plant materials studied by the two chemists were collected by Mr. D. H. Allen who was engaged in commercial activity in the vicinity of Iquitos, Peru. Both the *ayahuasca* (which is identified as *Banisteriopsis Caapi*) and the *yaje* (for which the determination *Prestonia amazonica* was offered) “were collected on the Napo River near Iquitos, Peru.” Hochstein and Paradies state in a footnote that “the botanical identification was made by Dr. R. Ferreyra of the University of San Marcos, Lima.” They do note parenthetically that these two vernacular names have, in the past, been cited as representing the same species, *Banisteriopsis Caapi*.

Nowhere in the paper, however, did the chemists state that voucher herbarium specimens, upon which a definitive identification could be based, had been sent in by the collector. Ferreyra (*in litt.*) informed us that he was not aware of the existence of any herbarium material in connection with these identifications. Faced with the lack of voucher specimens, the botanist often, in an attempt to be as helpful as possible in guiding the chemist, suggests a tentative identification based on a vernacular name, and the botanist’s words of qualification are sometimes disregarded. This is precisely what has transpired in the pres-

ent case. We note that Hochstein and Paradies are careful to explain that the "second plant, 'yage'. . . . was made available to us as an aqueous extract of the leaves." This statement, together with the knowledge that the identification was not based upon herbarium material, leads us to believe that the aqueous extract was sent in directly from the field. It is probable, therefore, that the identification was made by tracing the vernacular name *yaje* which, in much of the literature, has, for some inexplicable reason, often been referred to *Prestonia amazonica*.

A significant observation from the chemist's point of view was made recently, when Raffauf and Folger (22) stated that the "reported occurrence of only one simple indole in the Apocynaceae to date is of sufficient interest to warrant some speculation. The structure looks enough out of place to suggest that the sample studied was not *Prestonia* at all, and indeed, N,N-dimethyltryptamine was isolated from an aqueous extract of leaves, the botanical origin of which appears to be in doubt. Confirmation of the presence of this alkaloid in an authentic specimen of the plant is certainly necessary."¹

Because of the fundamental importance of a thorough and detailed understanding of the botanical sources of the New World narcotics, it seems advisable to us, in view of the existing confusion, to review the whole history of whether or not *Prestonia* is employed as an hallucinogen in the Amazon under the name *yaje*. In so doing, we realize that only further field work can be definitive. Such field work, nevertheless, should be attempted

¹The possibility that an authentic specimen of *Prestonia amazonica* would yield N,N-dimethyltryptamine must not be excluded. Tryptamine is recognized as a possible intermediate in the biogenetic pathways to the harman-type alkaloids on the one hand (Malpighiaceae, Rutaceae) and many of the more complicated indole types (Apocynaceae) on the other. See R. Hegnauer, *Planta Medica* 6 (1958) 1).

with as clear a picture of the literature and other prior sources as possible.

II.

There is a complex of narcotics, usually attributed to malpighiaceae species of the genera *Banisteriopsis*, *Tetrapterys* and possibly *Mascagnia*, which has three widely employed vernacular names. *Caapi* is the Nhen-gatú or Tupí-Guaraní epithet used in the northwestern Amazon of Brazil and in the Comisaría del Vaupés in adjacent Colombia; according to Spruce (29), it is the word for "grass" and here means "thin leaf." *Ayahuasca*, signifying "vine of the dead," comes from Kechwa and is the accepted name of the hallucinogenic drink and its source plant in Peru, Bolivia and part of Ecuador. *Yaje*, a word of obscure linguistic origin and unknown meaning, is the name applied to the drink and the source plant along the eastern slopes of the Andes in Colombia and Ecuador and in those parts of Peru near the Colombian boundary.

In 1905, Rocha (25) published an account of his trip to the headwaters of the Ríos Caquetá and Putumayo in Colombia and reported that the natives employed as a narcotic a "little bush" or "leaves" called *yajé*. His account of its properties coincided very closely with those described for *ayahuasca*, and it was widely assumed that the two were identical as to the source plant.

In 1923, the Colombian chemist Fischer (6) reported that the *yajé* which he had analyzed and which had come from the Colombian Caquetá might, on the basis of anatomic and histologic species, be a species of *Aristolochia*.

Botanists who have worked in the Colombian Comisaría del Putumayo and Caquetá, where the drink is called *yaje*, agree that the prime ingredient is *Banisteriopsis*. The German collector, Klug (19), studied *yaje* there in 1929 and found only *Banisteriopsis* employed.

The same is true of the botanist Cuatrecasas (4), who studied the narcotic in the same area in 1939. The Colombian botanist García-Barriga (8), who has met with *yaje* in this and other areas, mentions only *Banisteriopsis* as the principal ingredient. Schultes has seen *yaje* prepared and has partaken of it on a number of occasions in the Putumayo and elsewhere in Colombia and has not seen used as the basic plant anything but a species of *Banisteriopsis*. The Russian botanists, Varanof and Juzepczuk, who studied the problem in the Colombian Caquetá in 1925–26, likewise found several species of *Banisteriopsis* employed either alone or together in preparing *yaje* (9, 10).

In 1956, the Brazilian chemist Costa (3) on the basis of isolation of the alkaloid yageine from species of the Amazon basin identified *yaje* with *Banisteriopsis Caapi*.

A suggestion that *ayahuasca* and *yaje* might be different plants seems first to have been advanced by the French anthropologist Reinberg (23). His study of tribes living between the Río Napo and Río Curaray in Peru led him to publish in 1921 the statement that the narcotic drink was an infusion of a few fragments of *ayahuasca*, a liana the diameter of a man's thumb, and leaves of *yaje*, "un petit arbuste, de lm. 50 de haut, á feuilles petiolées (petiole de 15 mm.), entières, ovales, longues de 20 cm., larges de 7 cm., régulières et terminées par une pointe de 2 cm." This description, of course, could very accurately be applied to a species of *Banisteriopsis*. Reinberg reported that his determinations were based upon specimens, but a search in the herbarium at Paris failed to disclose the existence of any herbarium material at the present time. He held that his specimens showed that *ayahuasca* and *caapi* were conspecific, representing *Banisteriopsis Caapi*, but that the *yaje* of the Río Curaray could, with reservations, be referred to *Prestonia*

(approaching, in some respects, *P. amazonica*) or a related apocynaceous genus.

In 1922, the Belgian horticulturist-explorer Claes (1,2) studied *yaje* amongst the Koregwahe Indians of the Comisaría del Caquetá in Colombia. He learned that the *yaje*, hitherto usually described as a "small bush" was an enormous forest liana, and he argued quite justifiably that those who had described it as a small bush had seen only young, cultivated individuals and not the vine in its wild state. Claes did not offer a botanical determination of *yaje*. He mentioned, however, that the Belgian botanist De Wildeman believed that it "might be" *Prestonia amazonica*. This would be most unusual, since, so far as we know, *Prestonia amazonica* does not become an enormous jungle liana. No voucher specimens were located in the Rijksplantentuin in Brussels, and Claes himself stated that he had not obtained material for identifying *yaje*. With this statement, we must assume that De Wildeman was voicing an opinion which he based on the information he was able to glean in the literature through the use of the vernacular name.

The pharmacologists Michiels and Clinquart (17) worked on the stems which Claes had collected. In 1926, they suggested—whether from their own observations or from the opinions of De Wildeman we do not know—that the stems appeared to belong to *Prestonia amazonica*. The same year saw the French pharmacologist Rouhier dismiss as "doubtful" the possibility that *yaje* could be referable to *Prestonia amazonica*.

In 1930, the French botanist Gagnepain (7) tried rather unsuccessfully to put some order into the chaos. He pointed out that 1) according to Reinberg, *ayahuasca* was "probably" *Banisteriopsis Caapi* but that *yaje* could not be referred to this species; 2) *yaje* seemed to approach *Prestonia amazonica*; 3) fragments received as *yaje* by

Rouhier in 1924 showed the plant to be an "opposite-leaved vine"; and 4) both Reinberg and Rivet sent in material which seemed to represent the same malpighiaceous plant.

Somewhat later, Gagnepain received through Rouhier a specimen from the Departamento de El Valle in Colombia, where the plant had been cultivated under the name of *yaje*. The provenience of the plant was unknown. The specimen had leaves and inflorescences. When Gagnepain discovered that it represented *Banisteriopsis Caapi*, he arrived at a most astounding conclusion: that *yaje* of Colombia was the same as *caapi* of Brazil but was not the same as *yaje* of Ecuador. He asserted that Ecuadorian *yaje* represented a different species of *Banisteriopsis* than did Colombian *yaje*. Thus, he appeared to drop *Prestonia amazonica* as the source of any *yaje*.

Most recently, Fabre (5), in reviewing the historical aspects of the identification of *ayahuasca*, *caapi* and *yaje*, concluded that all three are prepared basically from *Banisteriopsis*, even though other plants may be used as additives.

Several non-botanical workers, without the benefit of voucher specimens, accepted *Prestonia amazonica* as the source of the narcotic. Their "identifications" served to focus attention in the literature on the apocynaceous plant without really adding anything new of basic value. Reutter (24), for example, reported in 1927 that he had isolated yageine and yagenine from the vegetal parts of *yaje* or *ayahuasca*, which he referred to *Prestonia amazonica*. In a dictionary of Amazon plants, LeCointe (13) indicated his belief that the botanical sources of *ayahuasca* and *yaje* were two different plants, pointing out that some writers attributed *yaje* to *Prestonia amazonica*. In 1936, Pardal (19) stated that *caapi* was *Banisteriopsis*

Caapi and *yaje* was *Prestonia amazonica*; but the following year, he (21) attributed both to *Banisteriopsis Caapi*. The German toxicologist Lewin (14,15,16) named *Prestonia amazonica* as one of the plants possibly employed as an admixture with *Banisteriopsis Caapi*. In 1947, Sandeman (27) mentioned *yaje* casually and referred it to *Prestonia amazonica*. Most recently, the chemists Mors and Zaltzman (18), arguing that the alkaloid yageine is different from harmine, concluded, on the basis of a review of the literature, that *caapi* and *ayahuasca* are referable to *Banisteriopsis Caapi* but that *yaje* was not the same plant.

III.

All of the reports concerning the use of *Prestonia amazonica* as a narcotic stem directly or indirectly from the work of the British plant-explorer Richard Spruce. Spruce's meticulous field notes were written down in 1852 but did not see publication until, after his death, they were edited by Wallace and published in book form in 1908 (29).

Spruce was the first to identify the source of the *caapi* drink of the Rio Uaupés in northwestern Brazil as a species of *Banisteriopsis*. It was a new species and was originally described as *Banisteria Caapi*. The correct name is now *Banisteriopsis Caapi*. The description of this new malpighiaceae species was based upon a flowering specimen collected by Spruce himself. In his notes, however, Spruce stated that there was another kind of *caapi* in the same region and that it was called *caapi-pinima* or "painted caapi." In his original field notebook, preserved at the Royal Botanic Gardens at Kew, we find the following entry under "2712. *Banisteria Caapi* Mss. From this is prepared an intoxicating drink known to all the natives on the Uaupés by the name of *caapi*. The lower part of the stem, which is the thickness of the thumb

swollen at the joints, is the part used. This is beaten in a mortar with the addition of water and a *small* quantity of the slender roots of the Apocynac. (apparently a *Haemadictyon*) called *caapi-pinima* or painted *caapi*, from its lvs. being stained and veined with red. . . . Query? May not the peculiar effects of the *caapi* be owing rather to the roots of the *Haemadictyon* (though in such small quantity) than to the stems of the *Banisteria*? The Indians, however, consider the latter the prime agent, at the same time admitting that the former is an essential ingredient. The two plants are planted near all mallocas (villages). . . .”

When these notes were published in Spruce’s “Notes of a botanist on the Amazon and Andes” (29), they suffered a slight change of emphasis. The terms of qualification disappeared. The published version states that *caapi-pinima* “is an apocynaceous twiner of the genus *Haemadictyon*, of which I saw only young shoots, without any flowers. The leaves are of a shining green, painted with the strong, blood-red veins. It is possibly the same species. . . . distributed by Mr. Benthham under the name *Haemadictyon amazonicum* n. sp. It may be the *caapi-pinima* which gives its nauseous taste to the *caapi*. . . . and it is probably poisonous. . . . , but it is not essential to the narcotic effect of the *Banisteria*, which (so far as I could make out) is used without any admixture by the Guahibos, Zaparos and other nations out of the Uaupés.”

Spruce was one of the most meticulous of all scientist-explorers of South America. A less careful and botanically untrained observer might easily have confounded the young shoots of a *Prestonia* with *Banisteriopsis*, for the leaves of both are opposite, and the leaves of some species of *Prestonia* do resemble remarkably those of *Banisteriopsis* in shape and texture. But Spruce could never have confused an apocynaceous plant, full of a

white latex, with a *Banisteriopsis*. He might have erred as to genus, for the genera of the *Apocynaceae* are often hard to distinguish even with flowers. But even this possibility would seem, in the case of Spruce, to be rather remote. Schultes, on his long collection trip along the Colombian and Brazilian course of the Río Vaupés, searched for an apocynaceous vine growing around Indian huts, as described by Spruce; although every Indian *Manihot*-plot boasts its several cultivated plants of *Banisteriopsis*, nothing resembling a *Prestonia* was ever seen under cultivation.

A careful reading of Spruce's notes reveals the fact that he never claimed more for *Prestonia* or *caapi-pinima* than the role of a plant used as an admixture. We know from the reports of later workers that other plants are sometimes added in minute amounts to the drink prepared from *Banisteriopsis* in the belief that they change the attributes or properties of the narcotic drink. Schultes (28) reported the admixture of leaves of an apocynaceous tree, possibly *Malouetia Tamaquarina*, amongst the Makuna Indians of the Río Popeyacá of Colombia. Later writers, without herbarium specimens to back their claims, and taking their cue from Spruce whose notes they misread or misunderstood, have proposed that the narcotic drink in one part of the Amazon where it is known as *yaje* is prepared exclusively from *Prestonia amazonica*. For this assertion there is absolutely no basis in field work.

Prestonia amazonica is known from only one collection, the type collection made by Spruce in 1859 at Trombetas on the lower Amazon. In more than a century, the species has never been found again. We are forced, consequently, to believe that *Prestonia amazonica* is either a very rare species or else a strict endemic, confined to the general area where the type was collected. The Río

Trombetas lies more than 1200 miles in a straight line from the eastern slopes of the Colombian Andes, where we are expected to believe that the natives are using this rare species in relative abundance as the source of their frequently employed *yaje*. The chances that *Prestonia amazonica* is used are, for all practical purposes, nonexistent; and there seem to be no indications that any species of *Prestonia* is so employed along the eastern slopes of the Colombian and Ecuadorian Andes. Even in the area where Spruce reported its possible use a hundred years ago, there is all probability that it was employed solely as an admixture with *Banisteriopsis Caapi*.

In the region through which the Río Vaupés flows, the Indians distinguish two kinds of *caapi*. Spruce reported the minor *caapi* to be called locally *caapi-pinima*. Koch-Grünberg (12) found that the Tukanos of the Vaupés know two kinds, but he could identify only one. In 1948, Schultes (28) discovered the Indians on the Rio Tikié, a Brazilian affluent of the Uaupés, preparing a narcotic drink from the malpighiaceae genus *Tetrapterys*. He described the new species *Tetrapterys methystica* on the basis of a flowering specimen from the forest liana. From the bark a definitely hallucinogenic drink was prepared. The drink was rather yellowish, unlike the usually chocolate-brown of the drink prepared from *Banisteriopsis Caapi*. One wonders whether or not the term "painted caapi" could be applied to the kind of *caapi* that makes the unusual yellow drink. Be that as it may, the drink prepared from *Tetrapterys* represents probably the second kind of *caapi* reported by Koch-Grünberg in 1909.

SUMMARY

While we are careful to point out that further field work, especially in Spruce's area along the Brazilian Rio

Uaupés, should be encouraged partly in an attempt to locate the use in *caapi* of a species of *Prestonia*, we believe that enough is known at the present time to make, in summary, the following statements:

- 1) There is no botanical support, nor any reliable support in the literature, for the assumption that any species of *Prestonia* (least of all *Prestonia amazonica*) is employed as the prime ingredient in the preparation of *ayahuasca*, *caapi* or *yaje*.
- 2) There is no reliable reference except Spruce's that any species of *Prestonia* is employed even as one of the minor ingredients or admixtures with *Banisteriopsis*.
- 3) There is serious doubt that the indole N,N-dimethyltryptamine occurs in *Prestonia* and every probability that the recent report of its presence in this genus was due to an erroneous identification of the material under analysis.

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